

## **CLAIMS**

What is claimed is:

1. An optical transmission system comprising:
  - 5 (a) an optical transmitter including an input for receiving an encoding signal and an encoder arranged to encode an optical signal with any one of a plurality of encoding signatures according to the encoding signal;
  - (b) a transmission link for conveying the encoded optical signal from the optical transmitter; and
  - 10 (c) an optical receiver comprising a grating decoder connected to receive the encoded optical signal from the input, the grating decoder incorporating a decoding signature matched to one of the encoding signatures so as to decode the encoded optical signal when encoded with the matched one of the encoding signatures.
- 15 2. A system according to claim 1, wherein the transmitter includes a modulator having drive electrodes and the encoding signal is an electrical signal connected to the drive electrodes.
- 20 3. A system according to claim 2, wherein the modulator is a phase modulator.
4. A system according to claim 2, wherein the modulator is an amplitude modulator.
- 25 5. A system according to claim 2, wherein the modulator is one of: an electro-acoustic modulator; and an electro-optic modulator.
6. A system according to claim 1, wherein the transmitter includes an optical delay line encoder.

7. A system according to claim 6, wherein the optical delay line encoder comprises one of: a fiber coupler, a fiber grating, a planar lightwave circuit (PLC) and an arrayed waveguide grating (AWG).

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8. A system according to claim 1, wherein the transmitter includes an electrically driven laser source and the encoding signal is an electrical signal connected as a drive current to bias the laser source.

10 9. A system according to claim 1, wherein the grating decoder additionally incorporates a filtering function to compensate for signal distortions that result from the application of the encoding signal to the optical signal.

15 10. A system according to claim 1, wherein the grating decoder comprises a refractive index modulation induced grating.

11. A system according to claim 10, wherein the refractive index modulation induced grating is formed in an optical fiber.

20 12. A system according to claim 1, wherein the grating decoder is arranged in reflection in combination with a circulator.

13. A system according to claim 1, wherein the grating decoder is configured to decode a spread-spectrum encoded optical signal.

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14. A receiver according to claim 1, wherein the grating decoder is configured to decode an OCDMA encoded optical signal.

15. An optical transmission method comprising:

